

Marked-up Set of Claims (According to 37 CFR 1.173(b)(2))

1. (Nine times amended) A method for dewatering biological sludge [that has been digested by]from a thermophilic digestion process, comprising:

a. adding a polymeric quaternary ammonium compound[s], as primary component, to the biological sludge; and

b. adding a cationic or separately adding an anionic polyacrylamide to the biological sludge;

such that [any combinations of] the polymeric quaternary ammonium compound[s] and [of]the polyacrylamide[s] enhance dewatering of the sludge.

2. (Nine times amended) The method for dewatering biological sludge according to claim 1, wherein [the]said polymeric quaternary ammonium compound[s] is[are from] poly(di-allyl di-methyl ammonium chloride (DADMAC))[family].

3. (Ten times amended) The method for dewatering biological sludge according to claim 1, wherein [the]said polymeric quaternary ammonium compound[s] is[are from] poly(epichlorohydrin di-methyl amine (epi-DMA))[family].

4. (Four times amended) The method for dewatering biological sludge according to claim 1, wherein [the]said polymeric quaternary ammonium compound is added directly to the sludge; and _____

_____, [upon]following the formation of microflocs of the sludge from addition of the polymeric quaternary ammonium compound, [a]said cationic polyacrylamide is added[to form a floc that dewateres the sludge].

5. (Four times amended) The method for dewatering biological sludge according to claim 4, wherein [the]said polymeric quaternary ammonium compound and [the]said cationic polyacrylamide are in an approximate[ly] 1:1 ratio, with [the]said cationic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound[does].

6. (Four times amended) The method for dewatering biological sludge according to claim 4, wherein the ratio[s] of [the]said polymeric quaternary ammonium compound with respect to [the]said cationic polyacrylamide range from about 1:10 to about 20:1.

7. (Twice amended) The method for dewatering biological sludge according to claim 4, wherein the polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between about 50 ppm:1 percent and about 300 ppm:1 percent.

8. (Three times amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is added directly to the sludge[, in an amount sufficient to cause formation of a cationic overcharge within a developed microfloc system], and wherein
said polyacrylamide is[and an] anionic[polyacrylamide is then added for final floc formation].

9. (Cancelled)

10. (Four times amended) The method for dewatering biological sludge according to claim 8, wherein [the]said polymeric quaternary ammonium compound and [the]said anionic polyacrylamide are in an approximate[ly] 10:1 ratio, with [the]said anionic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound[does].

11. (Amended) The method for dewatering biological sludge according to claim 10, wherein [the]said anionic polyacrylamide is about 40% anionic.

12. (Four times amended) The method for dewatering biological sludge according to claim 8, wherein the ratio[s] of [the]said polymeric quaternary ammonium compound to [the]said anionic polyacrylamide ranges from about 1:10 to about 20:1.

13. (Three times amended) The method for dewatering biological sludge according to claim 8, wherein the polymer concentration to solids ratio of total polymer dosage requirement in

relationship to percentage of solids component of the sludge is between approximately 50 ppm:1 percent and approximately 300 ppm:1 percent.

14. (Original) The method for dewatering biological sludge according to claim 1, wherein the biological sludge is mixed with primary sludge.

15. (Ten times amended) [A composition]The method for dewatering biological sludge according to claim 1, [comprising] wherein _____
_____ said polymeric quaternary ammonium compound[s, as primary component, and]
is added along with said cationic polyacrylamide[, said components being present in the composition in a ratio to enable the composition to function as an agent for dewatering biological sludge from a thermophilic digestion process].

16. (Eight times amended) The method for dewatering biological sludge according to claim 1, wherein [the]said cationic or anionic polyacrylamide and [the]said polymeric quaternary ammonium compound[s are]is [used]added in solution [or in dry] form.

17 – 21. (Canceled)

22. (Three times amended) A method for dewatering a sludge comprising water and solids, wherein the solids comprise thermophiles, the method comprising:
_____ contacting the sludge according to a technique selected from a group of techniques including:
_____ contacting the sludge with a polymeric quaternary ammonium compound along with a cationic polyacrylamide; and
_____ contacting the sludge first with a polymeric quaternary ammonium compound and then with a cationic polyacrylamide;
_____ to form a floc.

23. (Cancelled)

24. (Four times amended) The method of claim 22, wherein said polymeric quaternary ammonium compound comprises a molecular weight in the range of about 500,000 to about 3,000,000 and said cationic polyacrylamide comprises a molecular weight in the range of about 5,000,000 to about 16,000,000.

25. (Twice amended) The method of claim 22, wherein said polymeric quaternary ammonium compound is added in an amount sufficient to form microflocs of said thermophiles; and wherein
_____ said cationic polyacrylamide is added in an amount sufficient to agglomerate the microflocs into flocs for dewatering.

26. (Five times amended) The method of claim 22, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

27. (Twice amended) The method of claim 25, wherein the ratio of said polymeric quaternary ammonium compound to said cationic polyacrylamide is in the range of about 1:10 to about 20:1.

28. (Three times amended) The method of claim 25, wherein the concentration of said polymeric quaternary ammonium compound and said cationic polyacrylamide to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

29 – 32. (Canceled)

33. (Twice amended) A method for dewatering a sludge comprising water and thermophiles, the method comprising:
_____ adding to the sludge a polymeric quaternary ammonium compound.

34. (Canceled)

35. (Three times amended) The method of claim 33, wherein said polymeric quaternary ammonium compound is added in an amount sufficient to form microflocs of the thermophiles.

36. (Five times amended) The method of claim 35, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

37. (Three times amended) The method of claim 35, wherein the concentration of said polymeric quaternary ammonium compound to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

38. (Five times amended) The method of claim 35, further comprising the addition of an anionic polyacrylamide for final floc formation.

39. (Cancelled)

40. (Three times amended) The method of claim 38, wherein the concentration of said polymeric quaternary ammonium compound to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

41. (Three times amended) A sludge composition comprising:
water;
polyacrylamide comprising a cationic or an anionic moiety;
a polymeric quaternary ammonium compound; and
solids comprising thermophiles.

42 – 43. (Cancelled)

44. (Five times amended) The sludge composition of claim 41, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from

the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

45. (Three times amended) The sludge composition of claim 41, wherein the ratio of said polymeric quaternary ammonium compound to said polyacrylamide is in the range of about 1:10 to about 20:1.

46. (Three times amended) The sludge composition of claim 41, wherein the concentration of said polymeric quaternary ammonium compound and said polyacrylamide to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

47. (Four times amended) The sludge composition of claim 41, wherein said polymeric quaternary ammonium compound comprises a molecular weight in the range of about 500,000 to about 3,000,000; wherein

said polyacrylamide comprising a cationic moiety comprises a molecular weight in the range of about 5,000,000 to about 16,000,000; or wherein

said polyacrylamide comprising an anionic moiety comprises a molecular weight in the range of about 5,000,000 to about 15,000,000.

48. (Four times amended) A sludge composition comprising:
water;
polyacrylamide comprising a cationic or an anionic moiety;
a polymeric quaternary ammonium compound; and
solids comprising flocs of thermophiles.

49 – 50. (Cancelled)

51. (Five times amended) The sludge composition of claim 48, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

52. (Three times amended) The sludge composition of claim 48, wherein the ratio of said polymeric quaternary ammonium compound to said polyacrylamide is in the range of about 1:10 to about 20:1.

53. (Three times amended) The sludge composition of claim 48, wherein the concentration of said polymeric quaternary ammonium compound and said polyacrylamide to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

54. (Four times amended) The sludge composition of claim 48, wherein said polymeric quaternary ammonium compound comprises a molecular weight in the range of about 500,000 to about 3,000,000, wherein

said polyacrylamide comprising a cationic moiety comprises a molecular weight in the range of about 5,000,000 to about 16,000,000; or wherein

said polyacrylamide comprising an anionic moiety comprises a molecular weight in the range of about 5,000,000 to about 15,000,000.

55. (Four times amended) A sludge composition comprising:
water;
a polymeric quaternary ammonium compound; and
solids comprising thermophiles.

56 – 57. (Cancelled)

58. (Five times amended) The sludge composition of claim 55, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

59 – 66. (Cancelled)

67. (Amended) A sludge composition comprising:

water;

thermophiles; and

a polymeric quaternary ammonium compound.

68. (Five times amended) The sludge composition of claim 67, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

69. (Twice amended) The sludge composition of claim 67, wherein said polymeric quaternary ammonium compound is present in an amount sufficient to form microflocs of said thermophiles.

70. (Three times amended) The sludge composition of claim 67, further comprising a cationic or an anionic polyacrylamide.

71 – 72. (Canceled)

73. (Amended) The method of claim 33, wherein a cationic polyacrylamide is added.

74 – 79. (Canceled)

Claim List – Status and Support of Current Amendment Changes

| Claim | Status | Type | Support of Changes |
|--------------|---------------|-------------|---|
| 1 | Pending | Method | "cationic or anionic" is added, while "any combination of" is struck. Support is in the abstract and in col. 5 line 52 to col. 6 line 43 and Examples 1 – 7. |
| 2 | Pending | Method | "the" changed to "said" – antecedent basis. |
| 3 | Pending | Method | "the" changed to "said" – antecedent basis. |
| 4 | Pending | Method | "a" changed to "said" – antecedent basis. |
| 5 | Pending | Method | "the" changed to "said" – antecedent basis. |
| 6 | Pending | Method | "the" changed to "said" – antecedent basis. |
| 7 | Pending | Method | There are no changes in this amendment. |
| 8 | Pending | Method | "in an amount sufficient to cause formation of a cationic overcharge within a developed microfloc system" is struck from the claim. Support for amendment is in the abstract. "the" changed to "said" – antecedent basis. |
| 9 | Cancelled | N/A | N/A |
| 10 | Pending | Method | "the" changed to "said" – antecedent basis. "a" to "an" – grammar. |
| 11 | Original | Method | "the" changed to "said" – antecedent basis. |
| 12 | Pending | Method | "the" changed to "said" – antecedent basis. |
| 13 | Pending | Method | There are no changes in this amendment. |
| 14 | Pending | Method | There are no changes in this amendment. |
| 15 | Pending | Method | claim is amended to simply state "said cationic polyacrylamide" for antecedent basis. Support is in col. 5 line 39 to col. 6 line 9 and col. 6 line 44 to col. 7 line 47, Example 1 in col. 7 lines 49-62, and Examples 3, 4, 5, 6 and 7 in col. 8 line 10 to col. 9 line 25. |
| 16 | Pending | Method | "said cationic or anionic" is added for antecedent basis. |
| 17-21 | Cancelled | N/A | N/A |
| 22 | Pending | Method | There are no changes in this amendment. |
| 23 | Cancelled | N/A | N/A |
| 24 | Pending | Method | "polymeric quaternary ammonium compound having" and "cationic polyacrylamide having a" are struck. Support is in col. 5 line 52 to col. 6 line 9. |
| 25 | Pending | Method | There are no changes in this amendment. |
| 26 | Pending | Method | There are no changes in this amendment. |
| 27 | Pending | Method | There are no changes in this amendment. |
| 28 | Pending | Method | There are no changes in this amendment. |
| 29-32 | Canceled | N/A | N/A |
| 33 | Pending | Method | There are no changes in this amendment. |
| 34 | Cancelled | N/A | N/A |
| 35 | Pending | Method | There are no changes in this amendment. |
| 36 | Pending | Method | There are no changes in this amendment. |

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|---------|-----------|-------------|--|
| 37 | Pending | Method | There are no changes in this amendment. |
| 38 | Pending | Method | "wherein said polymeric quaternary ammonium compound is added in an amount sufficient to cause formation of said thermophiles into a developed microfloc system having a cationic overcharge, and wherein" is struck from the claim while "further comprising" is added. Support is in the abstract. |
| 39 | Cancelled | N/A | N/A |
| 40 | Pending | Method | There are no changes in this amendment. |
| 41 | Pending | Composition | There are no changes in this amendment. |
| 42-43 | Cancelled | N/A | N/A |
| 44 | Pending | Composition | There are no changes in this amendment. |
| 45 | Pending | Composition | There are no changes in this amendment. |
| 46 | Pending | Composition | There are no changes in this amendment. |
| 47 | Pending | Composition | "polymeric quaternary ammonium compound having" and "cationic polyacrylamide having a" are struck. Support is in col. 5 line 52 to col. 6 line 43. |
| 48 | Pending | Composition | There are no changes in this amendment. |
| 49-50 | Cancelled | N/A | N/A |
| 51 | Pending | Composition | There are no changes in this amendment. |
| 52 | Pending | Composition | There are no changes in this amendment. |
| 53 | Pending | Composition | There are no changes in this amendment. |
| 54 | Pending | Composition | "polymeric quaternary ammonium compound having" and "cationic polyacrylamide having a" are struck. Support is in col. 5 line 52 to col. 6 line 43. |
| 55 | Pending | Composition | There are no changes in this amendment. |
| 56 | Cancelled | N/A | N/A |
| 57 | Cancelled | N/A | N/A |
| 58 | Pending | Composition | There are no changes in this amendment. |
| 59-66 | Cancelled | N/A | N/A |
| 67 | Pending | Composition | There are no changes in this amendment. |
| 68 | Pending | Composition | There are no changes in this amendment. |
| 69 | Pending | Composition | There are no changes in this amendment. |
| 70 | Pending | Composition | claim amended to state "further comprising a cationic or an anionic polyacrylamide" – Support is in the abstract and in col. 5 line 52 to col. 6 line 43 and Examples 1 - 7. |
| 71 - 72 | Canceled | N/A | N/A |
| 73 | Pending | Method | There are no changes in this amendment. |
| 74 - 79 | Canceled | Method | N/A |